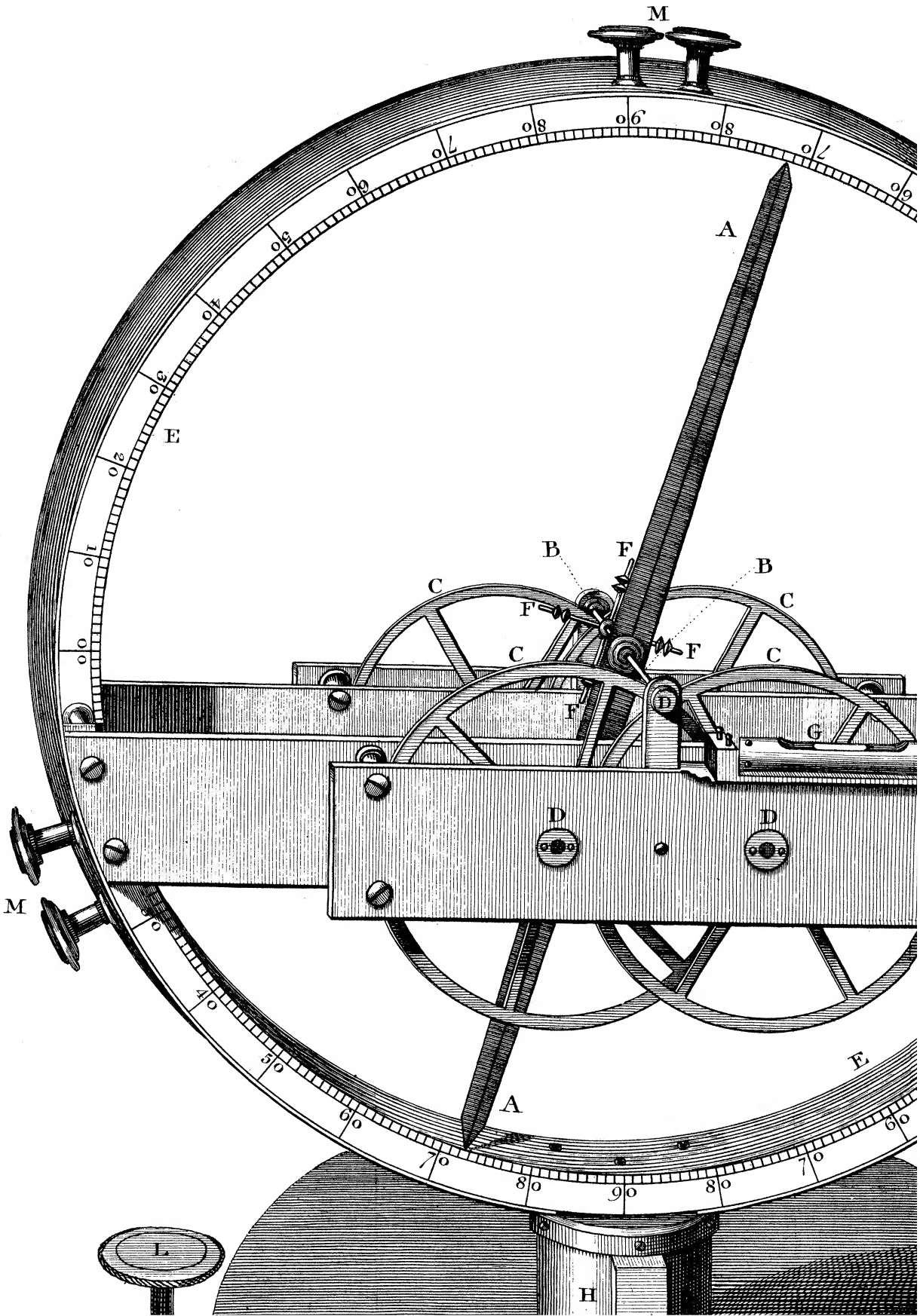
XXXV April 21, 1772. *Experiments on two Dipping-Needles, which Dipping-Needles were made agreeable to a Plan of the Reverend Mr.* Mitchell, *F. R. S. Rector of* Thornhill *in* Yorkſhire, *and executed for the Board of Longitude, by Mr.* Edward Nairne, *of* Cornhill, London.

Read July 9, 1772. THE magnetic needles were twelve inches long, and their axes (the ends of which were of gold allayed with copper) reſted on friction-wheels of four inches diameter, each end on two friction-wheels, which wheels were balanced with great care. The ends of the axes of the friction-wheels were likewiſe of gold allayed with copper, and moved in ſmall holes made in bell-metal; and oppoſite the ends of the axes of the needles, and the friction-wheels, were flat agates, finely poliſhed. Each magnetic needle vibrated in a circle of bell-metal, divided into degrees and half-degrees, and a line paſſing through the middle of the needle to the ends pointed to the diviſions. The minutes ſet down in the experiments were, by eſtimation, as the third of half a degree is counted ten minutes. The inſtruments were carefully placed, ſo that the needles vibrated exactly in the magnetic meridian.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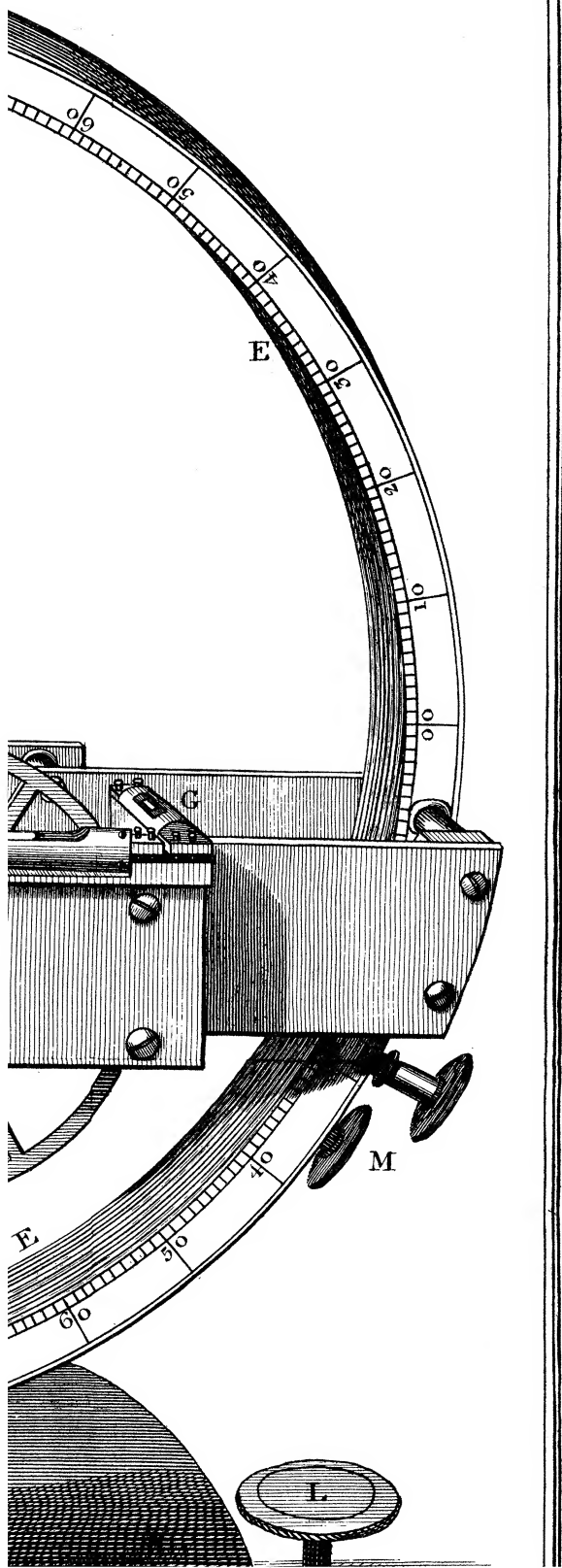
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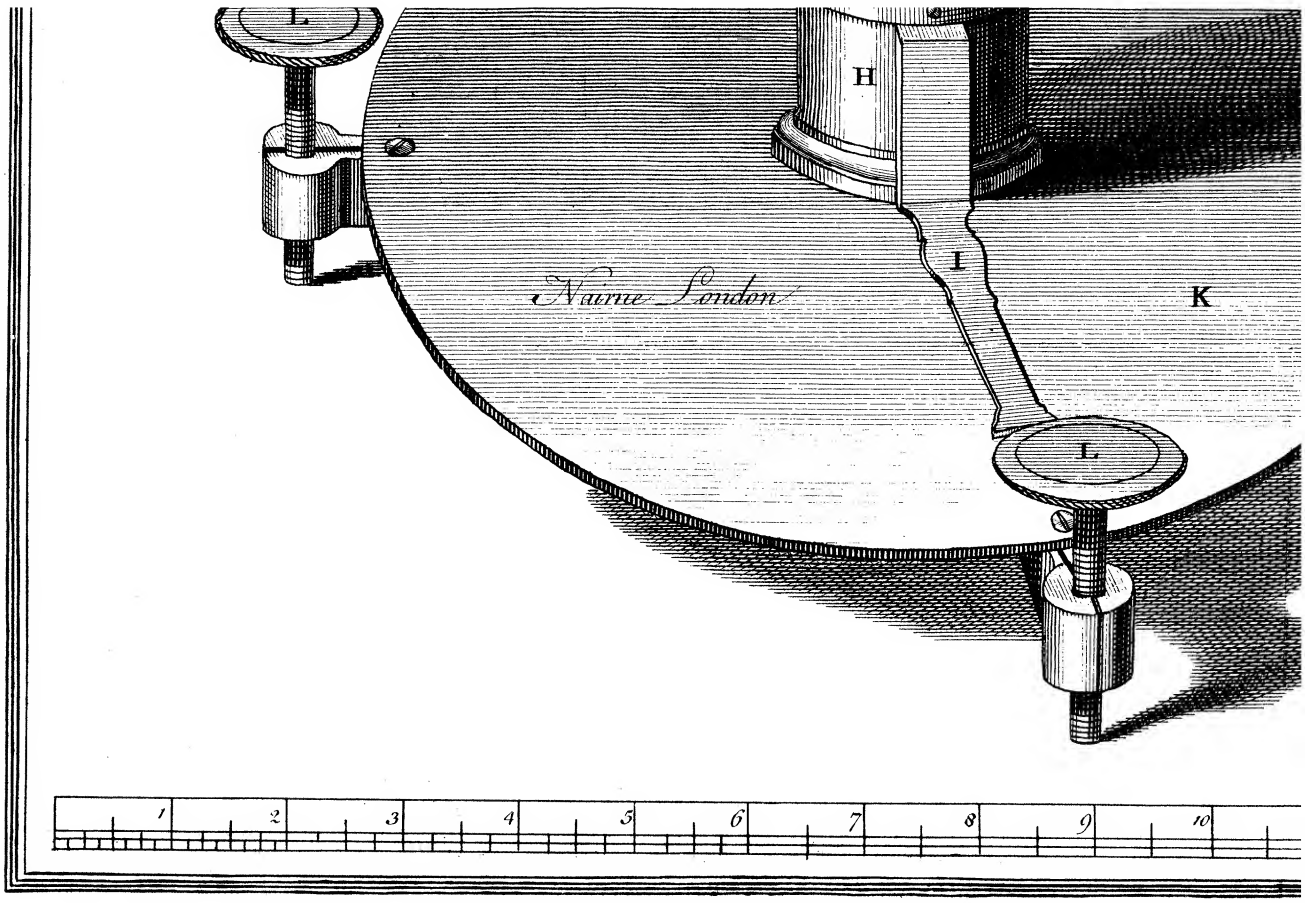
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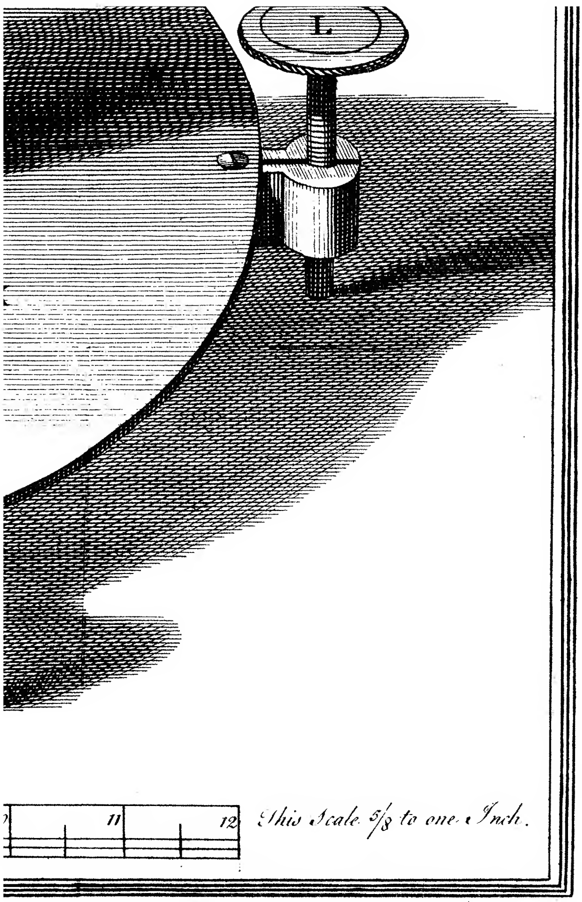

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meridian. The two needles were nearly balanced before they were made magnetical; but, by a curious contrivance of the Reverend Mr. Mitchell of a croſs fixed on the axes of the needles (on the arms of which were cut very fine ſcrews, to receive ſmall buttons, that might be ſcrewed nearer or farther from the axis), the needles could be adjuſted both ways, to a great nicety, after they were made magnetical, by reverſing the poles, and changing the ſides of the needle.

Firſt ſet of experiments made by Edward Nairne, at his houſe, N° 20, Cornhill.

°	′
72	20
72	20
72	20
72	20
72	20
72	20.

Second ſet of experiments, with that ſide of the inſtrument to the Eaſt, which was to the Weſt in the firſt obſervation.

°	′	
72	10	
72	15	
72	45	Here the ends of the axis touched the agates.
72	45	
72	5	
72.		

Third

Third ſet of experiments, in which the poles of the needle were reverſed, but the ſame ſide of the inſtrument to the Eaſt, as in the ſecond ſet of experiments, and the needle rather more magnetical, being touched with a larger ſet of magnets.

°	′
72	30
72	30
72	30
72	30
72	30
72	30.

Fourth ſet of experiments, viz. the ſame ſide of the inſtrument to the Eaſt, as in the firſt ſet of experiments.

°	′	
72	10	
72	10	
72	15	Obſerved by Mr. Wales.
72	10	
72	10	
72	10.	

Fifth experiment, viz. the ſame end of the needle made North, as in the firſt ſet of experiments, and alſo the ſame ſide of the inſtrument to the Weſt, as in the firſt ſet of experiments.

°	′
72	20.

Experiments

Experiments made April 22, 1772, with the other Dipping-needle, the inſtrument being put in the ſame place, and with great care, in the magnetic meridian, the needle pointed as under.

°	′	
72	15	
72	10	The poles of the needle changed.
72	20	The ſide of the inſtrument to the Eaſt, which in the firſt obſervation was to the Weſt.

Leſt any thing magnetical ſhould have affected the needle in Mr. Nairne's houſe, he took this inſtrument, and placed it in the middle of a large room belonging to the London Aſſurance in Birchin-Lane, and then the needle pointed to

°	′	
72	10 or 15	
72	20	
72	30	The poles of the needle changed.
72	10	The ſide of the inſtrument to the Eaſt, which in the firſt obſervation was to the Weſt.

The dipping-needle brought back to Mr. Edward Nairne's, and put in the ſame place as before, ſtood at

°	′
72	10 +

The

In the foregoing experiments, the needle was raiſed to an horizontal poſition, and left to vibrate. It was between 8 or 9 minutes before the vibration ceaſed.

The needle brought to an horizontal poſition, and one grain and a half laid on the extremity of the South end, was not ſufficient to keep it in an horizontal poſition; but the North end pointed to 35° 30′. One grain and three quarters laid on the extremity of the South end of the needle, was more than ſufficient to keep it in an horizontal poſition, the South end then pointing 6° 45′ below o.

It having been judged proper to have a Drawing of the Dipping-Needle, the following Plate [TAB. XIII.] has been made, wherein

A A Repreſents the needle.
B B The ends of the axis reſting on the friction-wheels.
C C C C The four friction-wheels.
D D D Where flat agate caps are ſet in.
E E E The divided circle of bell-metal.
F F F F The ends of the croſs for adjuſting the needle.
G G Two levels, whereby the line of o degrees of the inſtrument is ſet horizontal.
H The perpendicular axis, whereby the inſtrument may be turned, that the divided face of the circle may front the Eaſt or Weſt.
I An index fixed to the perpendicular axis H, and which points to an oppoſite line on the horizontal plate K, when the inſtrument is turned half round.
L L L L Four adjuſting ſcrews to ſet the inſtrument horizontal. One of them is hid behind the circle.
M M M M Screws which hold on the glaſs covers, to keep the needle from being diſturbed by the wind.

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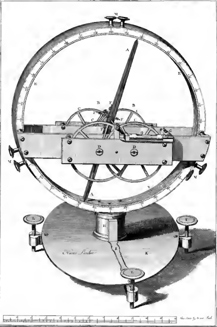
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